## ABSTRACT

A crossflow membrane device that receives a feedstock at a feed end face and separates the feedstock into permeate and retentate. The device has a membrane support containing at least one monolith of porous material defining a plurality of passageways extending longitudinally from the feed end face of the monolith to a retentate end face of the monolith through which the feedstock flows to pass retentate from the device. A permselective membrane coating of finer pore size than that of the porous material is applied to the passageway wall surfaces of the monolith. At least one permeate conduit is formed within the monolith, the conduit containing a plurality of longitudinal permeate chambers communicating with a means of permeate introduction at or near the feed end face and permeate withdrawal at or near the retentate end face. The permeate is separated from feed and retentate, and a portion of the permeate is circulated through the permeate conduit to create a decreasing permeate pressure within the permeate conduit from the feed end of the membrane device to the retentate end of the device to control transmembrane pressure along the length of the device.